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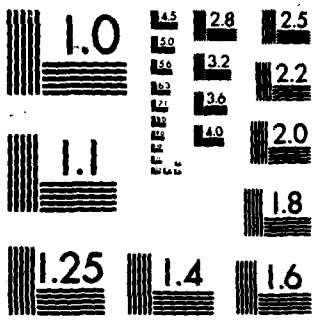

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US Army Corps of Engineers

ENVIRONMENTAL IMPACT RESEARCH PROGRAM

TECHNICAL REPORT EL-86-49

PRESS SEEDER AND PUNCH SEEDER

Section 8.4.4, US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL

by

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July 1986
Final Report

Prepared for DEPARTMENT OF THE ARMY
US Army Corps of Engineers
Washington, DC 20314-1000
Under EIRP Work Unit 31631

PREFACE

This work was sponsored by the Office, Chief of Engineers (OCE), US Army, as part of the Environmental Impact Research Program (EIRP), Work Unit 31631, entitled Management of Corps Lands for Wildlife Resource Improvement. The Technical Monitors for the study were Dr. John Bushman and Mr. Earl Eiker, OCE, and Mr. Dave Mathis, Water Resources Support Center.

This report was prepared by Mr. Ted B. Doerr, Range Science Department, Colorado State University, Fort Collins, Colo. Mr. Doerr was employed by the Environmental Laboratory (EL), US Army Engineer Waterways Experiment Station (WES), under an Intergovernmental Personnel Act contract with Colorado State University during the period this report was prepared. Mr. Chester O. Martin, Team Leader, Wildlife Resources Team, Wetlands and Terrestrial Habitat Group (WTHG), EL, was principal investigator for the work unit. Mr. Dan W. McKenzie, USDA Forest Service, Equipment Development Center, San Dimas, Calif., provided equipment specifications and photographs used to prepare line drawings. Review and comments were provided by Mr. Martin, WES, and Mr. Larry E. Marcy, Texas A&M University.

The report was prepared under the general supervision of Dr. Hanley K. Smith, Chief, WTHG, EL; Dr. Conrad J. Kirby, Chief, Environmental Resources Division, EL; and Dr. John Harrison, Chief, EL. Dr. Roger T. Saucier, WES, was Program Manager, EIRP. The report was edited by Ms. Jessica S. Ruff of the WES Information Products Division (IPD). Drawings were prepared by Mr. John R. Harris, Scientific Illustrations Section, IPD, under the supervision of Mr. Aubrey W. Stephens, Jr.

COL Allen F. Grum, USA, was the previous Director of WES. COL Dwayne G. Lee, CE, is the present Commander and Director. Dr. Robert W. Whalin is Technical Director.

This report should be cited as follows:

Doerr, Ted B. 1986. "Press Seeder and Punch Seeder: Section 8.4.4, US Army Corps of Engineers Wildlife Resources Management Manual," Technical Report EL-86-49, US Army Engineer Waterways Experiment Station, Vicksburg, Miss.

NOTE TO READER

This report is designated as Section 8.4.4 in Chapter 8 -- EQUIPMENT, Part 8.4 -- DRILL AND BROADCAST SEEDERS, of the US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL. Each section of the manual is published as a separate Technical Report but is designed for use as a unit of the manual. For best retrieval, this report should be filed according to section number within Chapter 8.

PRESS SEEDER AND PUNCH SEEDER

Section 8.4.4, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

The Oregon press seeder and the punch seeder are specialized seeders that currently have limited application. Although not considered similar in design, both types of seeders are described in this report for convenience of presentation.

PRESS SEEDER

The Oregon press seeder is a specialized drill seeder developed by the USDA Forest Service and Oregon State University for use on light, loose soils in sagebrush areas. The seeder firms the seedbed, creates planting furrows, plants the seeds, and covers the seeds in the furrows. Press seeders are not widely used because of the flexibility of the rangeland drill to a large variety of sites; however, they have utility on construction sites and wildlife habitat restoration projects where the soil is loose and dry (silty and sandy soils with little structure).

Description

The Oregon press seeder has 12 frame-mounted, independently suspended steel press wheels, each with a V-shaped ridge (Larson 1980). A seedbox is mounted immediately behind the press wheels with 12 long seed tubes to direct seed into the furrows created by the press wheels (Fig. 1). The furrows are covered by drag chains attached to the bottom of each seed tube. Further specifications are found in Table 1.

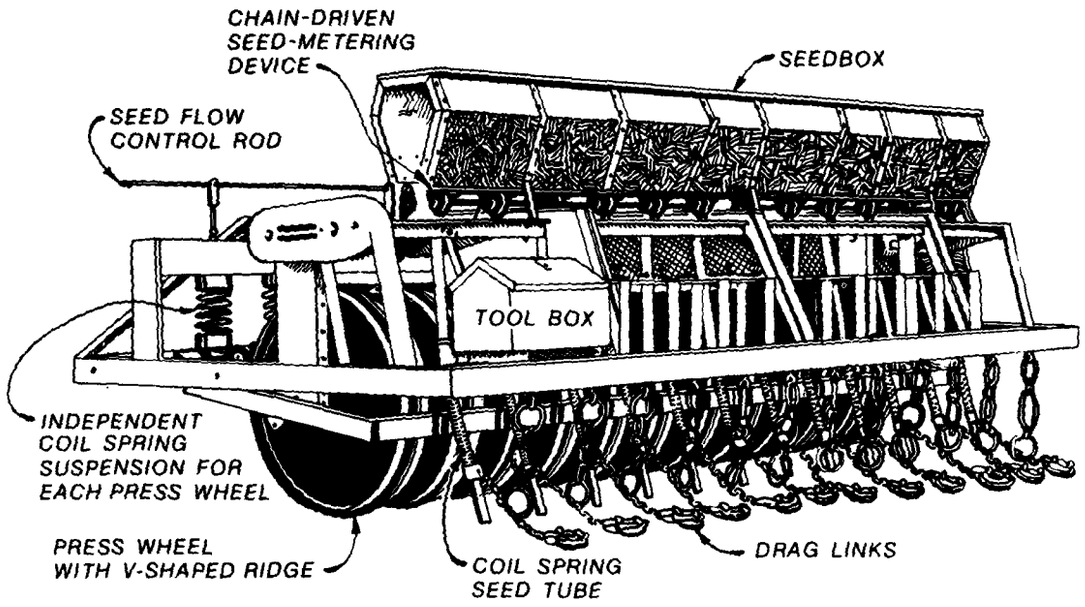

Figure 1. Oregon press seeder (drawn from photograph provided courtesy Dan McKenzie, USDA Forest Service)

Table 1. Specifications for Oregon press seeder

Feature	Specification
Number of furrows	12
Furrow spacing	12 in.
Furrow depth	1 in.
Presswheel diameter	32 in.
Presswheel width	6 in.
Seedbox capacity	31-43 cu ft
Overall width	13 ft
Operation speed	2-5 mph
Power requirements	42-72 hp

Operation

The press seeder is pulled behind a tractor during the seeding operation. The press wheels support the weight of the seeder, firm the seedbed, and create the seed furrows (Booster 1961, Vallentine 1971). Each press wheel can individually follow the land contour and pass over minor obstructions. The seedbox agitator and metering system are synchronized with the press wheel rotation by a gear-chain system similar to those found on other drill seeders. Seed are dropped into the furrow created by the press wheel and covered with loose soil (Larson 1980). Packed soil under the seed forms a firm seedbed, while leaf growth is unobstructed by the cover of loose soil.

Limitations

Oregon press seeders must be custom built and are not adapted to highly rocky soils or areas with dense litter and brush. The press seeder is most effective on loose dry soils (Booster 1961), but is not as effective on wet, firm soils as are other types of drill seeders (Vallentine 1971). Frequent breakdowns may also be a problem. The press seeder is difficult to transport without special equipment and techniques. Further information on press seeders may be obtained from the USDA Forest Service, Equipment Development Center, 444 E. Bonita Ave., San Dimas, California 91773.

PUNCH SEEDER

The punch seeder is a specialized piece of equipment designed to seed fragile, arid soils and other areas where surface disturbance needs to be kept to a minimum (USDA Forest Service 1982). The punch seeder creates a hole in the soil and places seed at a greater depth than can be accomplished by drill seeding; this establishes a more favorable temperature and moisture regime for seed germination and seedling survival (Moden and McKenzie 1982). Punch seeding was first developed for vegetable crops (Cary 1967, Heineman et al. 1973, Wilkins et al. 1979) but has since been tested on range sites in Texas (Hauser 1981) and Idaho (Moden 1983) with positive results. A punch seeder design is currently being tested by the USDA Forest Service Equipment Development Center and the University of Idaho.

Description

The prototype punch seeder being field tested by the Forest Service is a self-propelled, low-slung, modified tractor with the punch seeder mounted

between the back tires. Commercial punch seeders will have several seeding mechanisms mounted 12 in. apart on a tool bin frame. The punch seeder mechanism currently being used consists of a seedbox, metering system, flexible seed tube, and rigid tube (dibbler) with a protective gate (Fig. 2). The system currently is driven by electricity but ultimately will be powered by the motion of the support frame wheels. The circular motion of the wheel and axle that will be used to meter and agitate the seeds will be converted by a crank into a piston action to push the dibbler into the ground. Other specifications are listed in Table 2.

Operation

Commercial-type punch seeders will be towed 1 to 5 mph behind a tractor and will be able to seed 8 to 32 acres a day (Moden and McKenzie 1982). Seed will be pulled from the seedbox by agitators and gravity-fed into a metering device that dumps the correct number of seeds into the seed tube. The seeds will pass into the rigid tube and rest at the bottom. As the electric drive mechanism inserts the rigid tube 1 to 3 in. into the ground, the gate opens and allows the seeds to fall to the bottom of the hole (Fig. 2) (Hauser 1981, Moden and McKenzie 1982, Moden 1983). The dibbler is then retracted as the machine moves forward. The holes will not be filled with soil, but natural soil sloughing will occur to cover seed sufficiently without burying them too deeply (Moden 1983).

Limitations

Punch seeding equipment is still in the developmental stage and therefore is not available unless custom manufactured. Because it is experimental, the durability of equipment is not known and costs are only estimates. Punch seeding will be more expensive than broadcast or drill seeding and should be considered only for critical areas where vegetation establishment is difficult and soil disturbance must be kept to a minimum. The punch seeder is not commercially available at this time. Additional information may be obtained from the USDA Forest Service, Equipment Development Center, San Dimas, California.

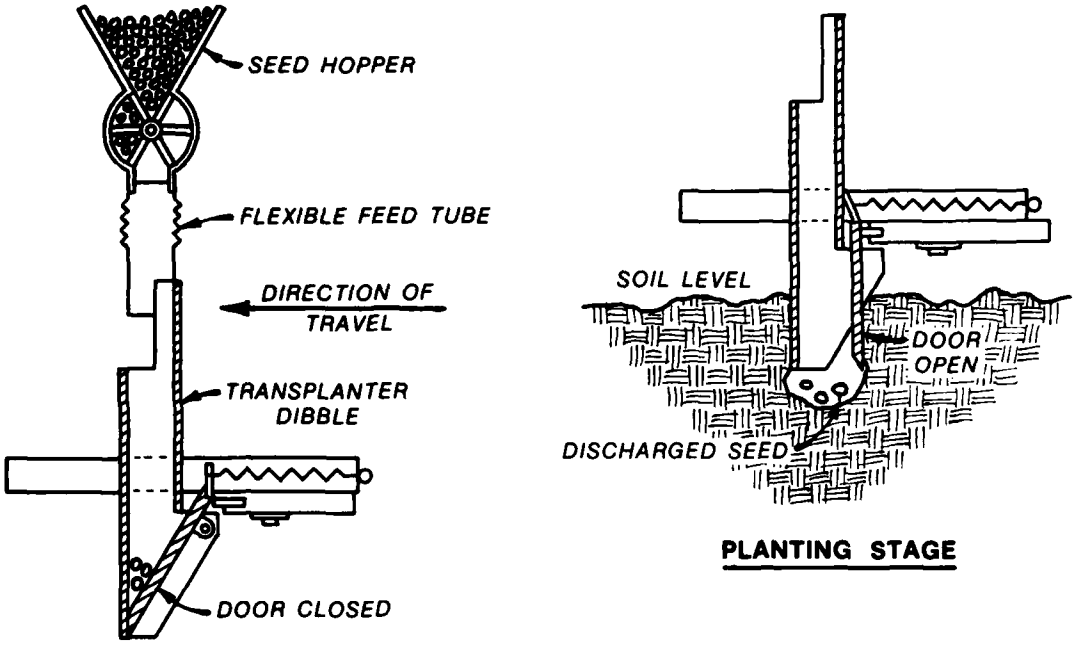

Figure 2. Schematic of a punch seeder, showing transplanter dibble mechanism at loading and planting stages (from Moden and McKenzie 1982)

Table 2. General specifications for punch seeders

Feature	Specification
Number of rows	2-6
Row spacing	12 in.
Dibble spacing	12 in.
Number of seeds per dibble	3-8
Operation speed	1-5 mph
Power requirements	10-60 hp

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